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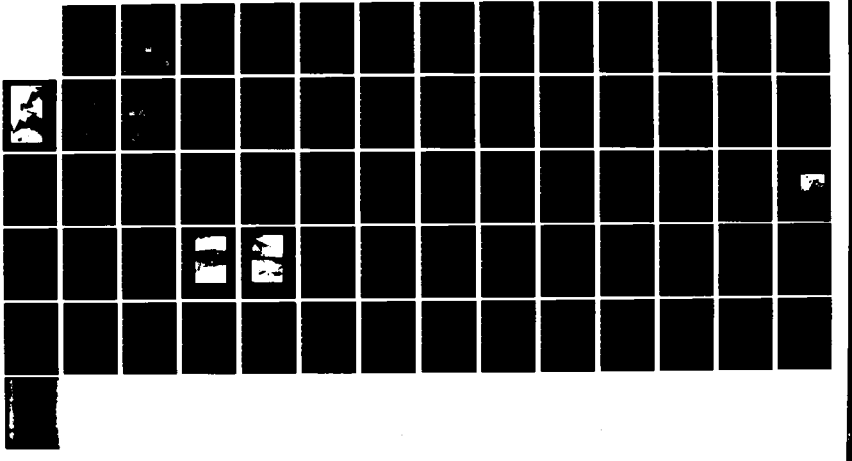

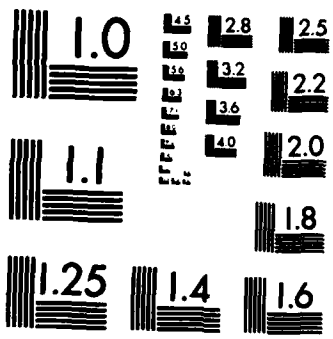

LOWER HOUSATONIC RIVER BASIN
SEYMOUR, CONNECTICUT

GREAT HILL RESERVOIR DAM
CT 00087

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

AUGUST 1978

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER: CT 00087	2. GOVT ACCESSION NO.: AD-A143 055
	3. RECIPIENT'S CATALOG NUMBER:
4. TITLE (and Subtitle): Lower Housatonic River Basin Seymour, Conn., Great Hill Reservoir Dam NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS	5. TYPE OF REPORT & PERIOD COVERED: INSPECTION REPORT
	6. PERFORMING ORG. REPORT NUMBER:
7. AUTHOR(s): U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION	8. CONTRACT OR GRANT NUMBER(s):
9. PERFORMING ORGANIZATION NAME AND ADDRESS:	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS:
11. CONTROLLING OFFICE NAME AND ADDRESS: DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254	12. REPORT DATE: August 1978 13. NUMBER OF PAGES: 70
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office):	15. SECURITY CLASS. (of this report): UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE:

16. DISTRIBUTION STATEMENT (of this Report)

APPROVAL FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,
Seymour, Conn.
Lower Housatonic River Basin
Great Hill Reservoir Dam

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The dam is a 210 ft. long concrete gravity structure with a central concrete round crested ogee weir 40 ft. in length, 3.0 ft. below top of dam. The dam has a maximum height of 41' ft. and a crest width of 6.0 ft. The gate house is adjacent to the left side of the spillway. The regulating outlets include a 16 inch direct supply main and a 20 inch low level intake, which outlets at the toe of the spillway. The rural drainage area is 2.64 square miles. The perimeter of the reservoir is heavily forested. Some minor development upstream along Fourmile Brook is occuring.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF:
NEDED

AUG 29 1979

Honorable Ella T. Grasso
Governor of the State of Connecticut
State Capitol
Hartford, Connecticut 06115

Dear Governor Grasso:

I am forwarding to you a copy of the Great Hill Reservoir Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Protection, the cooperating agency for the State of Connecticut. In addition, a copy of the report has also been furnished the owner, Ansonia-Derby Water Company, 230 Beaver Street, Ansonia, Connecticut 06401, ATTN: Mr. Fred Elliot.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Protection for your cooperation in carrying out this program.

Sincerely yours,

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

GREAT HILL RESERVOIR DAM

CT 00087

LOWER HOUSATONIC RIVER BASIN
SEYMOUR, CONNECTICUT

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

BRIEF ASSESSMENT

PHASE I INSPECTION REPORT

NATIONAL PROGRAM OF INSPECTION OF DAMS

Name of Dam:	GREAT HILL RESERVOIR DAM
State Located:	CONNECTICUT
County Located:	NEW HAVEN
Town:	SEYMOUR
Stream:	FOURMILE BROOK
Date of Inspection:	MAY 25, 1978
Inspection Team:	MIKE HORTON
	HECTOR MORENO
	GONZALO CASTRO
	DEAN THOMASSON

The dam is a 210 feet long concrete gravity structure with a central concrete round crested ogee weir 40 feet in length, 3.0 feet below top of dam. The dam has a maximum height of 41' feet and a crest width of 6.0 feet. The gate house is adjacent to the left side of the spillway. The regulating outlets include a 16 inch direct supply main and a 20 inch low level intake, which outlets at the toe of the spillway. The rural drainage area is 2.64 square miles. The perimeter of the reservoir is heavily forested. Some minor development upstream along Fourmile Brook is occurring. Approximately one mile downstream of the dam there exists several houses and a state road.

Based upon the visual inspection and past performance of the dam, the condition of the dam is generally good. The dam appears stable with no signs of movement or settlement. Visual inspection did not disclose an unstable condition due to seepage through the foundation or instability of the dam foundation or abutments.

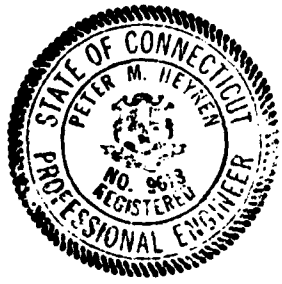
Based upon the size (intermediate) and hazard (high) classification in accordance with the Corps guidelines the test flood will be equal to the Probable Maximum Flood.

Based upon our hydraulic computations the spillway capacity is 810 cubic feet per second, which is equivalent to approximately 13 percent of the Test Flood. Peak inflow

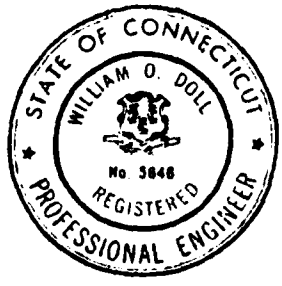
to the reservoir is 6,600 cubic feet per second; peak outflow (Test Flood) is 6,400 cubic feet per second with the dam being overtopped by 3.6 feet. The spillway is not adequate and will pass only 810 cfs at elevation 290 (top of dam). The average downstream flood stage along Fourmile Brook to its confluence with the Housatonic River will be 10 feet for an outflow of 13,300 cubic feet per second. The major impact of such a flood stage would be to wash out the bridge at Route 34 and another masonry arch located 100 feet upstream of Route 34. Before being washed out, back up would undoubtedly occur effecting a day nursery and at least one dwelling. Thus damage to life and property can occur in the vicinty of Route 34, on the east bank of the Housatonic River, one mile below the dam.

It is our opinion that further studies with regards to the geotechnical nature of the soil/rock at the abutments, dam base and key and a more refined hydrologic study be performed. Also a more detailed field survey to determine location and magnitude of overflow spillage will be required. All of the above should be done within one year of the owner's receipt of this Phase I Inspection Report.

After this information has been reviewed it can be determined whether or not corrective measures would be required.



Peter M. Heyrien, P.E.
Project Manager
Cahn Engineers, Inc.



William O. Doll, P.E.
Chief Engineer
Cahn Engineers, Inc.

This Phase I Inspection Report on Great Hill Reservoir Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

CHARLES G. TIERSCH, Chairman
Chief, Foundation and Materials Branch
Engineering Division

FRED J. RAVENS, Jr., Member
Chief, Design Branch
Engineering Division

SAUL COOPER, Member
Chief, Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspection. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionarly in nature. It would be incorrect to assume that the present condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions there of. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as neccessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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SECTION 7: ASSESSMENT, RECOMMENDATIONS & REMEDIAL MEASURES

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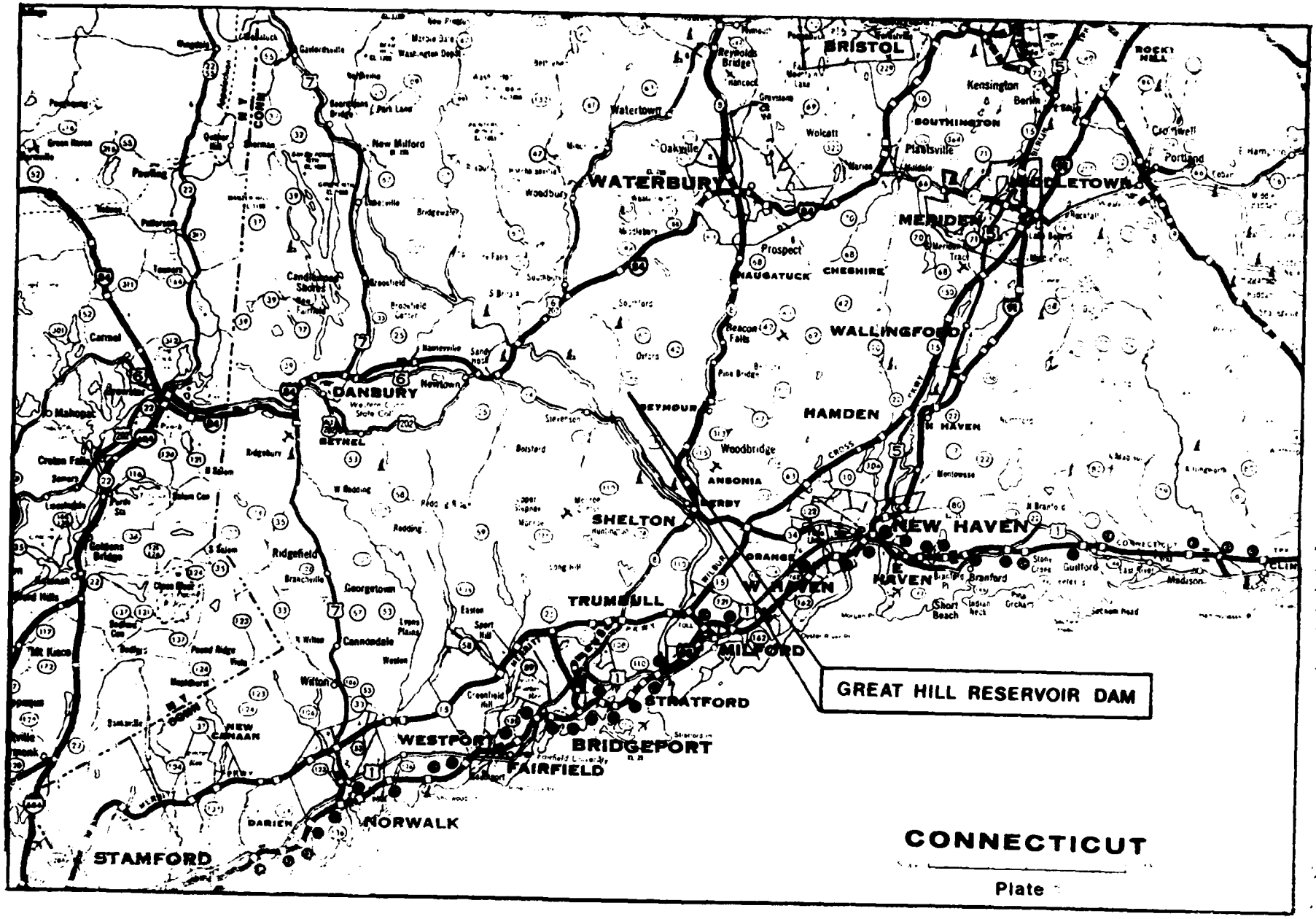
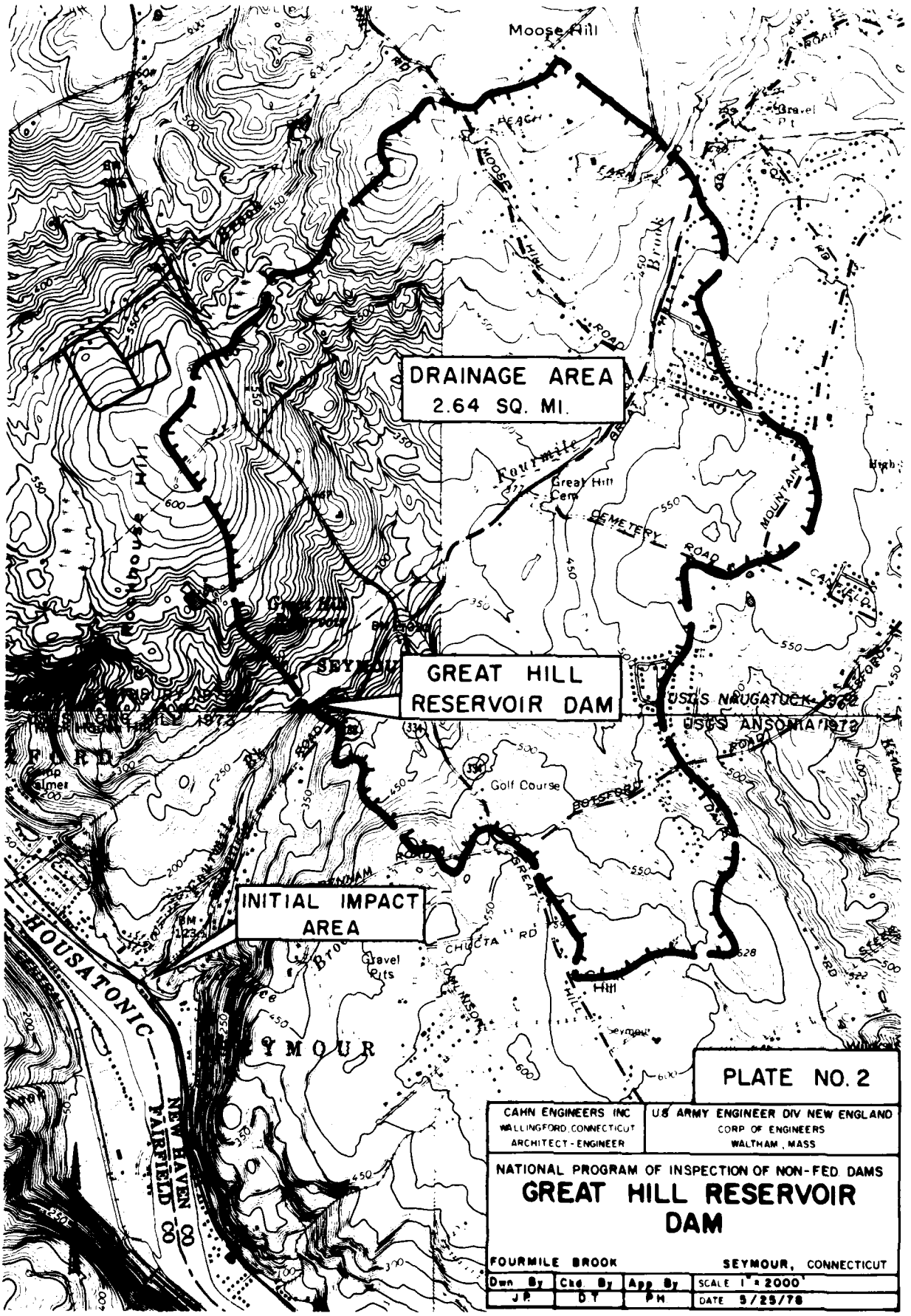
APPENDIX

*See Special Note Appendix Section B - Availability of Data.

OVERVIEW PHOTO

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS. CAHN ENGINEERS. INC. WALLINGFORD, CONN. ARCHITECT —— ENGINEER	NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS	GREAT HILL RESERVOIR DAM FOUR MILE BROOK	SEYMOUR CONNECTICUT	DATE 5/25/78 CE # 27 531 GA PAGE viii


BRISTOL
WATERBURY
MERIDEN
MIDDLETOWN
WALLINGFORD
HAMDEN
NEW HAVEN
DANBURY
SHELTON
TRUMBULL
MILFORD
STRATFORD
BRIDGEPORT
FAIRFIELD
WESTPORT
NORWALK
STAMFORD
GREAT HILL RESERVOIR DAM
CONNECTICUT
Plate


DRAINAGE AREA
2.64 SQ. MI.
GREAT HILL
RESERVOIR DAM
INITIAL IMPACT
AREA
Moose Hill
Four Mile
Great Hill
Cem
CEMETERY
ROAD
MOUNTAIN
ROAD
Golf Course
BOTSFORD
ROAD
CHUCTA
RD
HOUSATONIC
RIVER
NEW HAVEN
FAIRFIELD CO
USGS NAUGATUCK 1972
USGS ANSONIA 1972
SEYMOUR
PLATE NO. 2
CAHN ENGINEERS INC
WALLINGFORD, CONNECTICUT
ARCHITECT-ENGINEER
US ARMY ENGINEER DIV NEW ENGLAND
CORP OF ENGINEERS
WALTHAM, MASS
NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS
GREAT HILL RESERVOIR
DAM
FOURMILE BROOK
SEYMOUR, CONNECTICUT
Dwn By J.P.
Chd By D.T.
App By P.M.
SCALE 1" = 2000'
DATE 5/25/78

PHASE I INSPECTION REPORT

GREAT HILL RESERVOIR DAM

SECTION I

PROJECT INFORMATION

1.1 General

a. Authority - Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Cahn Engineers has been retained by the New England Division to inspect and report on selected dams in the southwestern state of Connecticut. Authorization and notice to proceed were issued to Cahn Engineers, Inc. under a letter of April 26, 1978 from Ralph T. Garver, Colonel, Corps of Engineers. Contract No. DACW33-78-C-0310 has been assigned by the Corps of Engineers for this work.

b. Purpose of Inspection Program - The purposes of the program are to:

(1) Perform technical inspection and evaluation of non-Federal dams to identify conditions requiring correction in a timely manner by non-Federal interest.

(2) Encourage and prepare the States to quickly initiate effective dam inspection programs for non-Federal dams.

(3) To update, verify and complete the National Inventory of Dams.

c. Scope of Inspection Program - The scope of this Phase I inspection report includes:

(1) Gathering, reviewing and presenting all available data as can be obtained from the owners, previous owners, the state and other associated parties.

(2) A field inspection of the facility detailing the visual condition of the dam, embankments and appurtenant structures.

(3) Computation concerning the hydraulic and hydrology of the facility and its relationship to the calculated flood through the existing spillway.

(4) An assessment of the condition of the facility and corrective measures required.

It should be noted that this report does not pass judgement on the safety or stability of the dam other than on a visual basis. The intent of the inspection program is to alert concerned parties of apparent necessary corrective action requirements or further investigation recommendations.

1.2 Description of Project

a. Description of Dam and Appurtenances - The dam is a 210 feet long concrete gravity structure with a central concrete round crested ogee weir 40 feet in length. The dam has a maximum height of 41.0 feet and a crest width of 6.0 feet. The gate house is adjacent to the left side of the spillway. The regulating outlets include a 16 inch direct supply main and a 20 inch low level intake which outlets at the toe of the spillway. The rural drainage area is 2.64 square miles. The perimeter of the reservoir is heavily forested. Some minor development upstream along Fourmile Brook is occurring.

b. Location - The dam is located on Fourmile Brook in a rural area in the the Town of Seymour, County of New Haven, State of Connecticut. The dam is shown on the Southbury U.S.G.S. Quadrangle Map having coordinates of longitude W 73° 07'56" and latitude N 41° 22'32".

c. Size Classification - Intermediate (Height 41.0 Ft), (Storage 378 Acre Ft.).

d. Hazard Classification - High (Category I) State Highway Route 34 and several houses located 4500 ft. downstream. A ten foot high flood stage caused by a potential dam failure would wash out the bridge at Route 34 and another masonry arch 100' upstream of it. Roads at these are 15 to 16' above the streambed. Before being washed out, backup would undoubtally occur. The day nursery and at

least one home, which are 13 feet above the streambed, would get flooded to some degree. Thus damage to life and property can potentially occur in the vicinity of Route 34, on the east bank of the Housatonic river.

e. Ownership - Ansonia-Derby Water Company
230 Beaver Street
Ansonia, Connecticut 06401
Mr. Fred Elliott (203) 735-1888

f. Purpose of Dam - Public Water Supply (at present no longer used - does not meet current water quality criteria). Local sporting clubs are allowed to use the reservoir area at this time.

g. Design and Construction History - The dam is believed to have been originally constructed in 1909 for the Birmingham Water Company. The engineer and contractor are not known. At an unknown later date the top of the dam and the downstream face were covered with a thin (1" to 4") mortar facing. The dam's present appearance does not suggest any other raisings or modifications.

h. Normal Operational Procedures - No formal operational procedures exist for this dam due to the present water quality.

1.3 Pertinent Data

a. Drainage Area - 2.64 square miles.

b. Discharge at Damsite - Maximum Flood Not Known. Total spillway capacity at maximum pool elevation 810 cfs.

c. Elevations - (Ft. above MSL, U.S.G.S. Datum)

Top of Dam:	293
Spillway Crest:	290
Streambed at Centerline of Dam:	256
20" Low Level Intake	259
16" Supply Main:	263

d. Reservoir

Length of Normal Pool:	2000 feet
Length of Maximum Pool:	2000+ feet

e. Storage -

Normal Pool:	360 Acre Ft
Maximum Pool:	378 Acre Ft

f. Reservoir Surface - Normal Pool: 13.8 Acres

Maximum Pool: 13.8+ Acres

g. Dam - Type: Concrete gravity.
Length: 210'
Height: 41.0'
Top Width: 6.0'
Side Slope: Vertical-upstream
1H to 2V-downstream
Cutoff: Concrete foundation keyed into rock.

h. Diversion and Regulatory Tunnel - Not Applicable

i. Spillway - Type: Concrete-round crested ogee.
Length of Weir: 40'
Crest Elevation: 290'
Upstream Channel: Vertical
Downstream Channel: 10H to 1V

j. Regulatory Outlets - 16 inch Supply Main
20 inch Low Level Intake

Both are manually operated from the gatehouse on the upstream face of the dam.

SECTION 2: ENGINEERING DATA

2.1 Design

a. Available Data - The available data consists of a drawing supplied by the owner and Inventory Data sheet provided by the State of Connecticut and the owner. See Appendix B for available existing data.

b. Design Features - The existing drawing indicates the design features stated previously herein.

c. Design Data - There were no engineering values, assumptions, test results or calculations available for the original construction.

2.2 Construction

a. Available Data - The one existing drawing, included in Appendix B, indicates the dam substantially as constructed.

b. Construction Considerations - No construction consideration information was available.

2.3 Operations

Daily lake levels between 1973 and 1977 had been taken on this dam until the water quality was judged inadequate. The maximum known water over the spillway was 4 inches on December 2, 1974. This information is available at the owners office.

2.4 Evaluation

a. Availability - Existing data was provided by the State of Connecticut and the owner. The owner representative made the operations available for visual inspection.

b. Adequacy - Due to the limited amount of detailed engineering data available (dam purchased from Birmingham Water Company 1973 $\pm$, transfer of records minimal) the final assessment of this investigation must be based primarily on visual inspection, performance history and hydraulic/hydrologic assumptions.

c. Validity - The engineering data substantially agrees with the field observations.

SECTION 3: VISUAL INSPECTION

3.1 Findings

a. General - The appearance of the dam is generally good, except for spalling of the parged concrete face.

b. Dam - Bedrock outcrops occur along the right side of the lower stream for more than 200 ft downstream of the spillway.

Examination of the outcrops revealed that the bedrock in the vicinity is consistent with what has been previously described in the USGS bedrock geology maps as the Collinsville Formation. The rock exposed in the outcrops can be described as hard, medium gray, fine to medium grained schistose gneiss. The rock exhibits well-developed foliation, accounting for its slabby character, and is predominantly gneissic in texture. The texture occasionally exhibits a segregation of biotite/muscovite micas from quartz/feldspar in the form of distinct banding. Quartz is abundant and occasionally occurs as lenses or elliptical pods (Augen Structure).

The trend of foliation was measured at several locations within about 200 ft of the dam and strikes N70 to 73° east and dips to the southeast 16 to 22°. The predominant joint pattern parallels foliation and tends to occur along planes of mica concentrations at 3 to 6 inch intervals. Minor jointing occurs perpendicular to foliation.

There were no seeps observed at the base of the dam. At the base of the right abutment, a small seep of clear water was observed through the exposed bedrock joints about 20 ft. downstream of the dam.

The abutments downstream of the dam appear stable with no indications of sloughing or significant erosion. Since the reservoir was at about the level of the spillway crest, the abutments upstream of the dam could not be observed.

c. Appurtenant Structures - The channel immediately downstream of the dam has stone retaining walls on both left and right banks. The walls are in good condition, except at the downstream end of both walls where a short section of the walls have collapsed.

d. Reservoir - The topography surrounding the reservoir slopes rapidly to the water. The shoreline is heavily forested. Sedimentation from winter sanding of roads washes into the reservoir at its northern end.

e. Downstream Channel - The downstream channel is the natural streambed. There is no evidence of slope instability or of substantial obstructions to flow in the channel.

3.2 Evaluation

The visual inspection did not disclose any findings indicating an unstable condition due to seepage through the foundation or to instability of the dam foundation or of the abutments downstream of the dam. The inspection team did not observe a downstream bulge as described in Appendix B.

SECTION 4: OPERATIONAL PROCEDURES

4.1 Regulating Procedures

No regulating procedures exist for this dam. Due to water quality requirements this reservoir has been taken out of service.

4.2 Maintenance of Dam

The dam is visited at least once a week to check on vandalism. Maintenance when needed is reported during these visits.

4.3 Maintenance of Operating Facilities

The maintenance of the operating facilities is on an as needed basis. The low level valve is greased once a year and inspected and operated at least twice a year in the spring and fall.

4.4 Description of Any Warning System in Effect

No formal warning system is in effect. The dam operator reports emergency situations directly to his supervisor. Depending on the situation the supervisor either contacts his engineers or calls the State Police and Seymour Police Departments to alert downstream residents.

4.5 Evaluation

A regular maintenance program should be established.

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. Design Data - No computations could be found for the original dam construction.

b. Experience Data - From late fall to early summer water flows over the spillway. The maximum water level over the spillway was recorded to be 4 inches on December 2, 1974. Prior to and during our field inspection the following sequence of events occurred which exhibit the ability of the reservoir to be drained during emergency situations.

(1) 5/24/78 PM - Ansonia-Derby Water Company opens blow off a small amount so as to lower water level approximately 1" to 2" to be at or below spillway elevation for the next day.

(2) 5/24/78 PM to 5/25/78 AM - Water outletting while precipitation produces 2.5± inches.

(3) 5/25/78 7:30 AM - 1 hour before we arrive, Ansonia-Derby opens valve additional amount to get water below spillway. Elevation prior to our arrival is unknown.

(4) 5/25/78 8:30 AM - Water level below spillway when we arrived. We observed blow off flowing and then valve was shut off.

c. Visual Observations - On the date of the inspection the spillway was clear and unobstructed.

d. Overtopping Potential - The test flood for this high hazard intermediate size dam is equal to the Probable Maximum Flood (PMF) of 6400 cfs.

Based upon our hydraulic computations, the spillway capacity is 810 cfs (Appendix D-3). Based upon "Preliminary Guidance for Estimating Maximum Probable Discharges" dated March 1978, peak inflow to the reservoir is 6,600 cfs (Appendix D-5); peak outflow for the test flood is 6,400 cfs with the dam overtopped 3.6' (Appendix D-7).

e. Spillway Adequacy - The spillway is not adequate. It will pass only approximately 13 percent of the Test Flood at elevation 290 (top of dam).

SECTION 6: STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

1. Embankment - The dam appears stable with no signs of movement or settlement.

2. Appurtenant Structures

a. The spillway is in good condition with no indications of structural problems.

b. The valve chamber is in good condition with no indication of structural problems.

b. Design and Construction Data - The design and construction data is insufficient to formally evaluate the stability of the dam.

c. Operating Records - None of the available records indicates that foundation stability problems have developed in the past 69 years in which the dam has been in existence and in particular during the September, 1938 and August, 1955 floods.

d. Post Construction Changes - The only post construction work in evidence is of maintenance nature. This has apparently not affected the stability of the dam.

e. Seismic Stability - This dam is in Seismic Zone 1 and hence does not have to be evaluated for Seismic Stability, according to the USCE Recommended Guidelines.

SECTION 7: ASSESSMENT, RECOMMENDATIONS/REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition - Based upon our hydraulic computations the spillway capacity is 810 cubic feet per second. Based upon "Preliminary Guidance for Estimating Maximum Probable Discharge" dated March 1978, peak inflow to the reservoir is 6,600 cubic feet per second; peak outflow is 6,400 cubic feet per second with the dam being overtopped by 3.6 feet. The spillway is not adequate and will pass only 13% of the peak outflow. The average downstream flood stage along Fourmile Brook to its confluence with the Housatonic River will be 10 feet for a reach outflow of 13,300 cubic feet per second. The major impact of such a flood stage would be to wash out the bridge at Route 34 and another masonry arch located 100 feet upstream of Route 34. Before being washed out, backup would undoubtedly occur effecting a day nursery and at least one dwelling. Thus damage to life and property can occur in the vicinity of Route 34, on the east bank of the Housatonic River, one mile below the dam.

b. Adequacy of Information - There is not enough available information to evaluate the stability of the dam other than by visual inspection. In particular, the foundation stability of the dam cannot be evaluated without extensive data on the quality of bedrock immediately under the dam.

c. Urgency - The recommendations and remedial measures presented in Sections 7.2 and 7.3 should be implemented within one year of the owner's reciept of this Phase I Inspection Report.

d. Need for Additional Information - There is a need for additional information as described in Section 7.2.

7.2 Recommendations

1. It is our opinion that further studies with regards to the geotechnical nature of the soil/rock at the abutments, dam base, and key and a more refined hydrologic study be performed. Also a more detailed field survey to determine location and magnitude of overflow spillage will be required. Depending on the results of those studies, items 2 and 3 below may be required.

2. Provide capability for passing the Test Flood without causing dam failure or significant downstream damage.

3. Implement surface improvements which may be required at the abutments of the dam to minimize erosion caused by water flowing over the dam.

7.3 Remedial Measures

a. Alternatives - This study has identified no practical alternatives to the recommendations.

b. Operation and Maintenance Procedures - An operation and maintenance plan should be instituted to include:

1. Repair of spalled areas along entire length of dam including the crest and up and downstream faces; while establishing a regular maintenance program to resurface reoccurring spalled areas of the dam.

2. Inspection of the dam at least once every 2 years by an inspector qualified in dam inspection.

3. Opening of the low level outlet valve twice a year for a minimum of 6 hours. This would assure that it is operable and that the inlet doesn't clog with sediment.

4. Round the clock surveillance should be provided by the owner during periods of unusually heavy precipitation. The owner should develop a formal system with local officials for warning downstream residents in case of an emergency.

APPENDIX

SECTION A: VISUAL OBSERVATIONS

VISUAL INSPECTION CHECK LIST

PARTY ORGANIZATION

PROJECT Great Hill

DATE: May 25, 1978

TIME: 8:30 a.m.

WEATHER Drizzly 65°F

W.S. ELEV. 290 U.S. 257 DN.S

PARTY:	INITIALS:	DISCIPLINE:
1. Mike Horton	MH	Structural
2. Hector Moreno	HM	Hydraulic
3. Gonzalo Castro	GC	Geotechnical
4. Dean Thomasson	DT	Recorder
5.		
6.		

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Concrete Dam Embankment	DT/MH/GC	
2.	Spillway	DT/MH/GC	
3.	Outlet Works - Operating House	MH/DT	
4.	Reservoir	DT	
5.	Operation and Maintenance	DT	
6.	Safety and Performance	DT	
7.			
8.			
9.			
10.			
11.			
12.			

PERIODIC INSPECTION CHECK LIST

PROJECT Great Hill **DATE** May 25, 1976

PROJECT FEATURE Concrete Dam Embankment

AREA EVALUATED	BY	CONDITION
Crest Elevation	DT	290
Current Pool Elevation	DT	290
Maximum Impoundment to Date	DT	Four (4) inches over spillway. December 2, 1974.
General Condition of Concrete Surfaces	MH	Vertical faces severely spalled.
Condition of Joints (Describe Location)	MH	Some seepage at vertical expansion joints.
Spalling	MH	Severe spalling at right end upstream side.
Visible Reinforcing	MH	None.
Rusting or Staining of Concrete	MH	None.
Any Seepage or Efflorescence	MH	Yes - at vertical joints.
Joint Alignment	MH	Good.
Cracking	MH	Yes - In parged downstream surface. Top of dam resurfaced and in good condition.
Rusting or Corrosion of Steel	-	
Erosion or Cavitation	-	
Alignment of Monoliths	MH	Good.
Numbering of Monoliths	-	
Differential Settlement	GC	None observable.
Condition of Structure Foundation	GC	Good.
Structure Additions	MH	None.

PERIODIC INSPECTION CHECK LIST

PROJECT Great Hill DATE May 25, 1978

PROJECT FEATURE Spillway - Approach, Channel, Weir, Discharge Channel

AREA EVALUATED	BY	CONDITION
a. Approach Channel	DT	Not observable if any water at spillway crest.
General Condition		
Loose Rock Overhanging Channel		
Trees Overhanging Channel		
Floor of Approach Channel		
b. Weir and Training or Sidewalls	MH	Good.
General Condition of Concrete	MH	Good.
Rust or Staining	MH	None.
Spalling	MH	Yes - generally over entire structure.
Any Visible Reinforcing	MH	No.
Any Seepage or Efflorescence	MH	No.
Drain Holes	MH	No.
c. Discharge Channel		
General Condition	GC	Good.
Loose Rock Overhanging Channel	GC	Some on right bank.
Trees Overhanging Channel	GC	Some, but not of significance.
Floor of Channel	GC	Bedrock with scattered boulders.
Other Obstructions	GC	None observed.
Retaining Walls	GC	Stone wall, slabby schist, rock pieces placed horizontally; generally in good condition. Drainage pipes through right wall discharging a little water.

PERIODIC INSPECTION CHECK LIST

PROJECT Great Hill DATE May 25, 1978

PROJECT FEATURE Outlet Works - Control Tower, Operating House, Gate Shafts

AREA EVALUATED	BY	CONDITION
a. Concrete and Structural		
General Condition	MH	Good.
Condition of Joints	MH	Good.
Spalling	MH	Yes-around structure ± of spillway elevation.
Visible Reinforcing	MH	None.
Rusting or Staining of Concrete	MH	None.
Any Seepage or Efflorescence	MH	Slight in gate shaft.
Joint Alignment	MH	Good.
Unusual Seepage or Leaks in Gate Chamber	MH	None.
Cracks	MH	None.
Rusting or Corrosion of Steel	MH	None.
b. Mechanical and Electrical		
Air Vents	MH	None.
Float Wells	MH	None.
Crane Hoist	MH	None.
Elevator	MH	None.
Hydraulic System	MH	None.
Service Gates	MH	None.
Emergency Gates	MH	None.
Lighting Protection System	MH	None.
Emergency Power System	MH	None.

PERIODIC INSPECTION CHECK LIST

PROJECT Great Hill DATE May 25, 1978

PROJECT FEATURE Outlet Works - Control Tower, Operating House, Gate Shafts

AREA EVALUATED	BY	CONDITION
Wiring and Lighting System in Gate Chamber	DT	None below floor slab for operation of reservoir. Feed boxes for chlorination house are located here.

PERIODIC INSPECTION CHECK LIST

PROJECT Great Hill **DATE** May 25, 1978

PROJECT FEATURE Reservoir

AREA EVALUATED	BY	CONDITION
Shoreline	DT	Heavily forested walked every two weeks.
Sedimentation	DT	North end from sanding highway during winter.
Potential Upstream Hazard Areas	DT	None.
Watershed Alteration - Runoff Potential	DT	Some development along four mile brook upstream.

PERIODIC INSPECTION CHECK LIST

PROJECT Great Hill **DATE** May 25, 1978

PROJECT FEATURE Operation and Maintenance

AREA EVALUATED	BY	CONDITION
a. Reservoir Regulation Plan		No plan - reservoir was taken out of service as a water supply
Normal Conditions	DT	
Emergency Plans	DT	The dam is visited once to twice a week to check on vandalism.
Warning System	DT	Emergency situations are reported to supervisor.
b. Maintenance (Type) (Regularity)		
Dam	DT	No maintenance since dam was acquired from Birmingham Water Co. in 1973 ±.
Spillway	DT	
Outlet Works	DT	Valves greased and checked at least twice a year. The owner demonstrated the blowoff.

PERIODIC INSPECTION CHECK LIST

PROJECT Great Hill **DATE** May 25, 1978

PROJECT FEATURE Safety and Performance Instrumentation

AREA EVALUATED	BY	CONDITION
Headwater and Tailwater Gages	DT	When previously operated as a water supply lake levels were taken daily.
Horizontal and Vertical Alignment Instrumentation (Concrete Structures)	DT	None.
Horizontal and Vertical Movement, Consolidation, and Pore-Water Pressure Instrumentation (Embankment Structures)	DT	None.
Uplift Instrumentation	DT	None.
Drainage System Instrumentation	DT	None.
Seismic Instrumentation	DT	None.

APPENDIX
SECTION B: EXISTING DATA

SPECIAL NOTE

SECTION B

AVAILABILITY OF DATA

The plans listed in the Table of Contents, Appendix Section B, are included in the master copy of this report, which is on file at the office of the Army Crops of Engineers, New England Division, in Waltham, Massachusetts.

No. ~~54-14~~

Inventoried By WPS

Date 18 MAY 1964

WATER RESOURCES COMMISSION
SUPERVISION OF DAMS
INVENTORY DATA

73-079

LN # 41-22.5

Name of Dam or Pond GREAT HILL RESERVOIR

Code No. H 16.7 FR 10

Nearest Street Location SQUANTUCK ROAD

Town SEYMOUR

U.S.G.S. Quad. SOUTHBURY

Name of Stream FOURMILE BROOK

Owner THE ~~BIRMINGHAM~~ WATER COMPANY

Address 142 ~~MAIN~~ STREET

DERBY

1909

Pond Used For WATER SUPPLY

Dimensions of Pond: Width 300 FEET Length 2000 FEET Area 15 ~~OR~~ ACR

Total Length of Dam 150 FEET Length of Spillway 25 FEET

Location of Spillway CENTER OF DAM

Height of Pond Above Stream Bed 40 FEET

Height of Embankment Above Spillway 3 FEET

Type of Spillway Construction CONCRETE

Type of Dike Construction CONCRETE

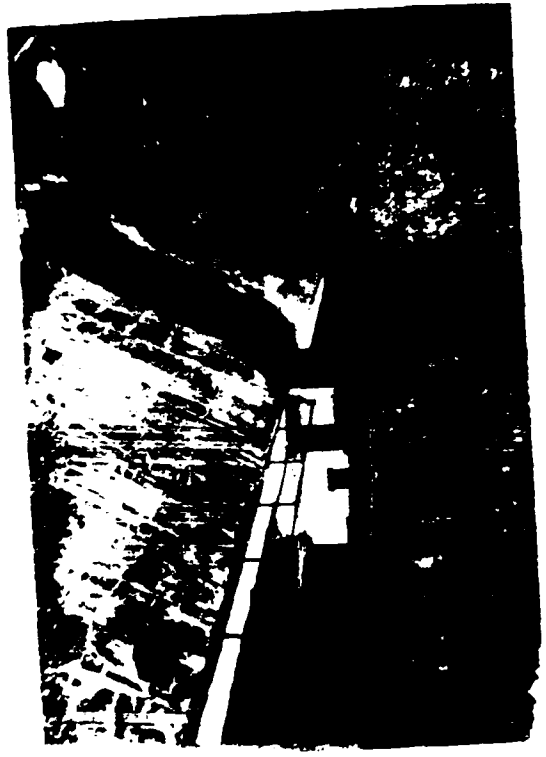
Downstream Conditions ROUTE 34

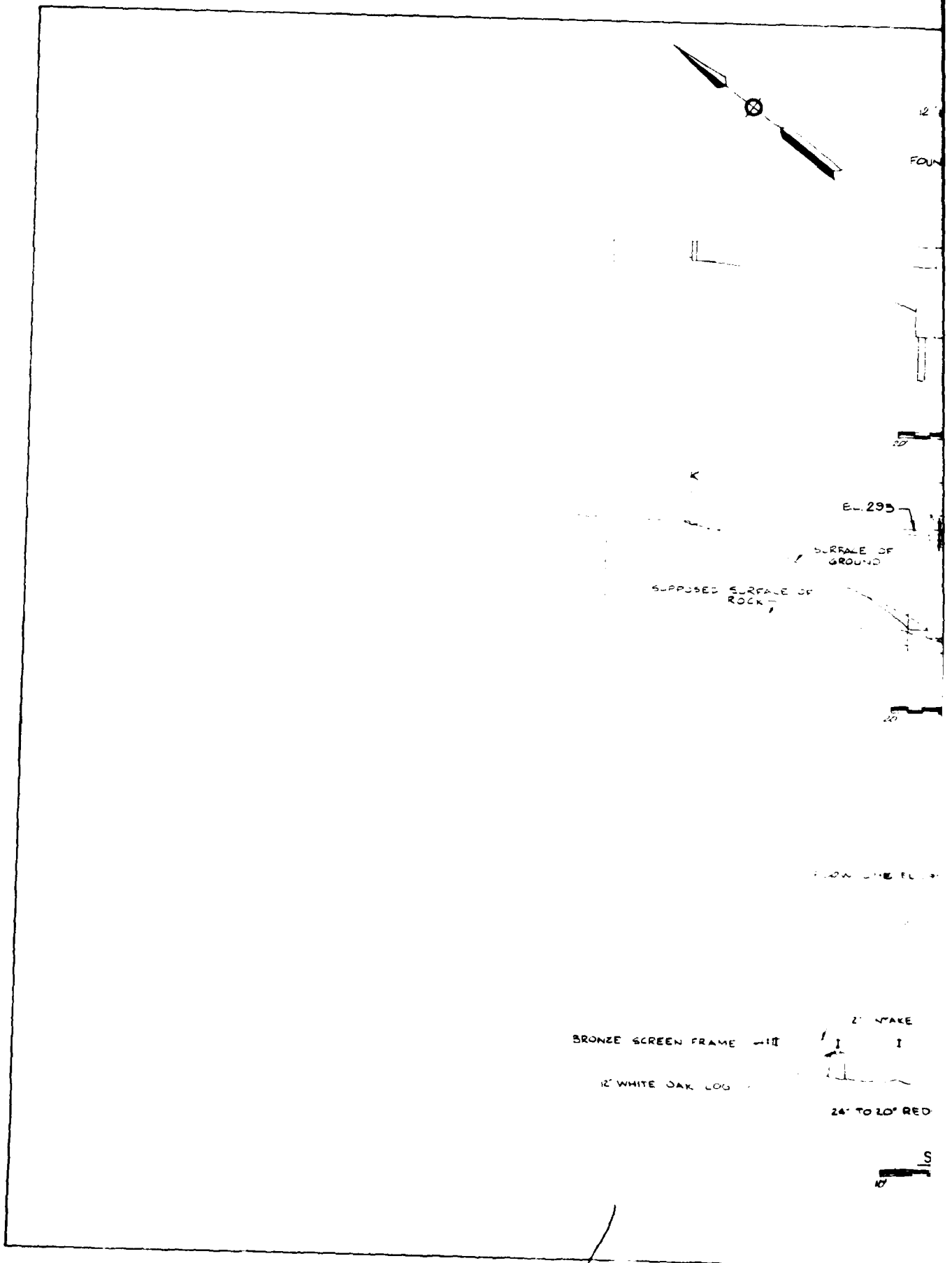
Summary of File Data

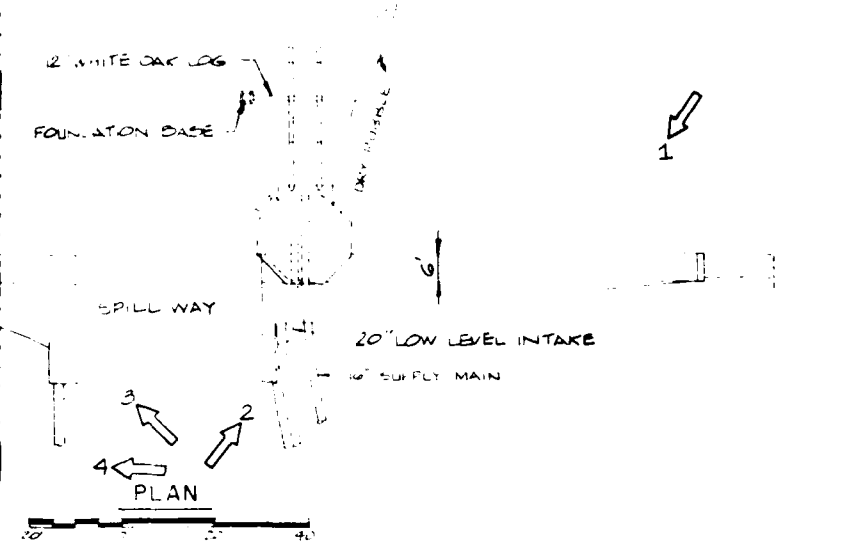
Remarks SOME SPALLING AT SPILLWAY AND ON DAM. NO SIGN OF SEEPAGE. DAM WAS BUILT AROUND 1910 AND IS BULGED DOWNSTREAM SLIGHTLY.

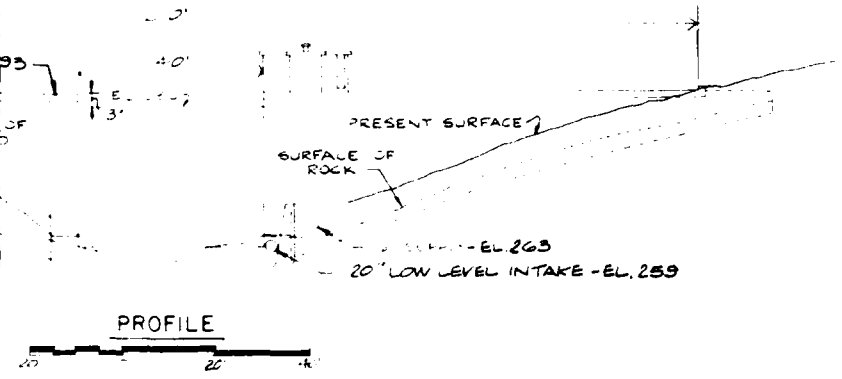
B-1

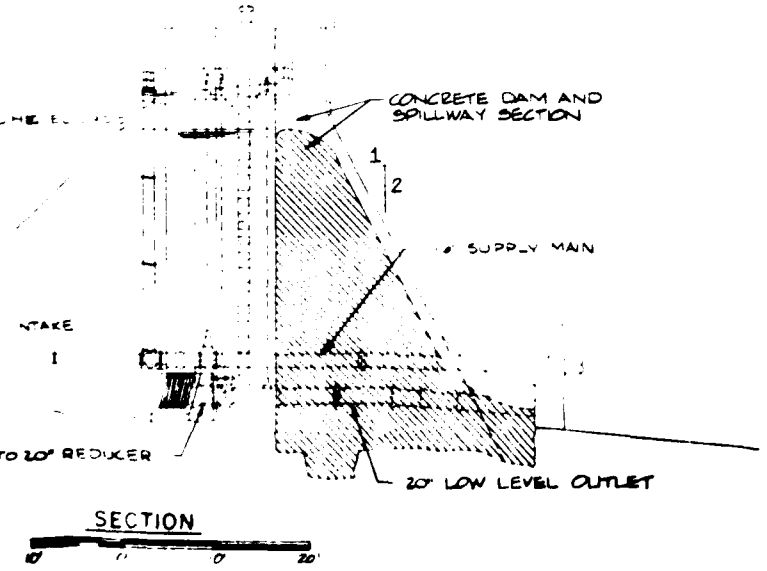
Would Failure Cause Damage? YES Class B




FOUN
EL. 295
SURFACE OF GROUND
SUPPOSED SURFACE OF ROCK
BRONZE SCREEN FRAME
12" WHITE OAK LOG
24" TO 20" RED







NOTE: ALL INFORMATION SHOWN HEREIN HAS BEEN COMPILED FROM EXISTING RECORDS & VISUAL OBSERVATIONS.

⇨1 PHOTO NUMBER AND DIRECTION

CAHN ENGINEERS INC. WALLINGFORD CONNECTICUT ARCHITECT ENGINEER	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

GREAT HILL RESERVOIR DAM

FOURMILE BROOK — SEYMOUR, CONNECTICUT

DR. BY	CHK BY	APP. BY	SCALE AS NOTED
JM	DMT	MH	DATE 9/25/78

PAGE B-4

APPENDIX

SECTION C: DETAIL PHOTOGRAPHS

PHOTO NO.1 - Spalling at upstream face of left abutment.

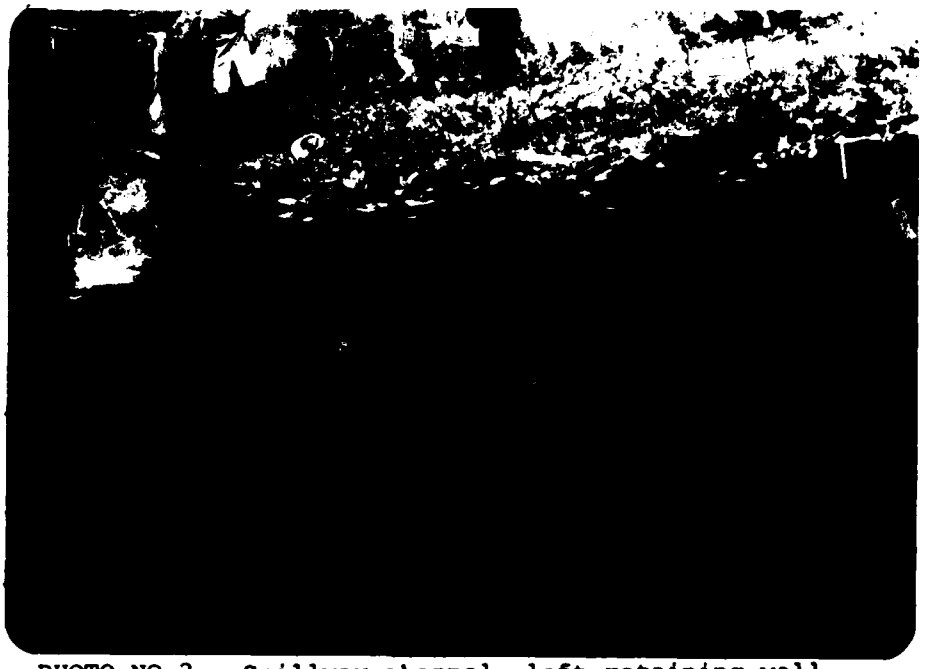


PHOTO NO.2 - Spillway channel, left retaining wall.

PHOTO NO.3 - Cracking of parged surface of downstream right abutment.

PHOTO NO.4 - Right abutment, immediately downstream of dam. Note exposed bedrock.

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.	NATIONAL PROGRAM OF	GREAT HILL RESERVOIR DAM FOUR-MILE BROOK SEYMOUR, CONN.
CAHN ENGINEERS INC. WALLINGFORD, CONN. ARCHITECT—— ENGINEER	INSPECTION OF NON-FED. DAMS	CE# 27531 GA DATE 5/25/78 PAGE C-2

APPENDIX

SECTION D: HYDRAULIC/HYDROLOGIC COMPUTATIONS

PRELIMINARY GUIDANCE

FOR ESTIMATING

MAXIMUM PROBABLE DISCHARGES

IN

PHASE I DAM SAFETY

INVESTIGATIONS

New England Division
Corps of Engineers

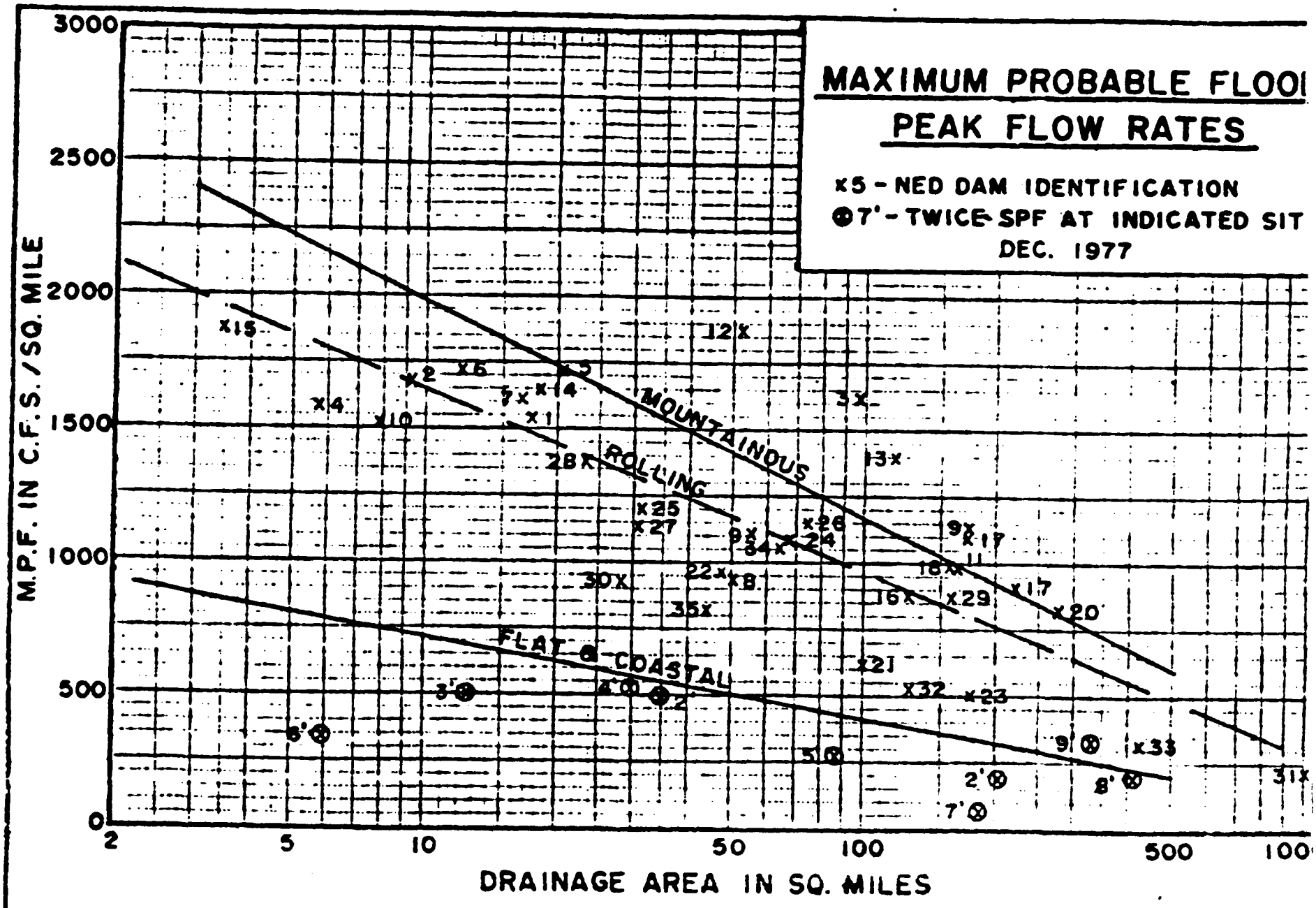
March 1978

MAXIMUM PROBABLE FLOOD INFLOWS
NED RESERVOIRS

	Project	Q (cfs)	D.A. (sq. mi.)	MPF cfs/sq. mi.
1.	Hall Meadow Brook	26,600	17.2	1,546
2.	East Branch	15,500	9.25	1,675
3.	Thomaston	158,000	97.2	1,625
4.	Northfield Brook	9,000	5.7	1,580
5.	Black Rock	35,000	20.4	1,715
6.	Hancock Brook	20,700	12.0	1,725
7.	Hop Brook	26,400	16.4	1,610
8.	Tully	47,000	50.0	940
9.	Barre Falls	61,000	55.0	1,109
10.	Conant Brook	11,900	7.8	1,525
11.	Knightville	160,000	162.0	987
12.	Littleville	98,000	52.3	1,870
13.	Colebrook River	165,000	118.0	1,400
14.	Mad River	30,000	18.2	1,650
15.	Sucker Brook	6,500	3.43	1,895
16.	Union Village	110,000	126.0	873
17.	North Hartland	199,000	220.0	904
18.	North Springfield	157,000	158.0	994
19.	Ball Mountain	190,000	172.0	1,105
20.	Townshend	228,000	106.0(278 total)	820
21.	Surry Mountain	63,000	100.0	630
22.	Otter Brook	45,000	47.0	957
23.	Birch Hill	88,500	175.0	505
24.	East Brimfield	73,900	67.5	1,095
25.	Westville	38,400	99.5(32 net)	1,200
26.	West Thompson	85,000	173.5(74 net)	1,150
27.	Hodges Village	35,600	31.1	1,145
28.	Buffumville	36,500	26.5	1,377
29.	Mansfield Hollow	125,000	159.0	786
30.	West Hill	26,000	28.0	928
31.	Franklin Falls	210,000	1000.0	210
32.	Blackwater	66,500	128.0	520
33.	Hopkinton	135,000	426.0	316
34.	Everett	68,000	64.0	1,062
35.	MacDowell	36,300	44.0	825

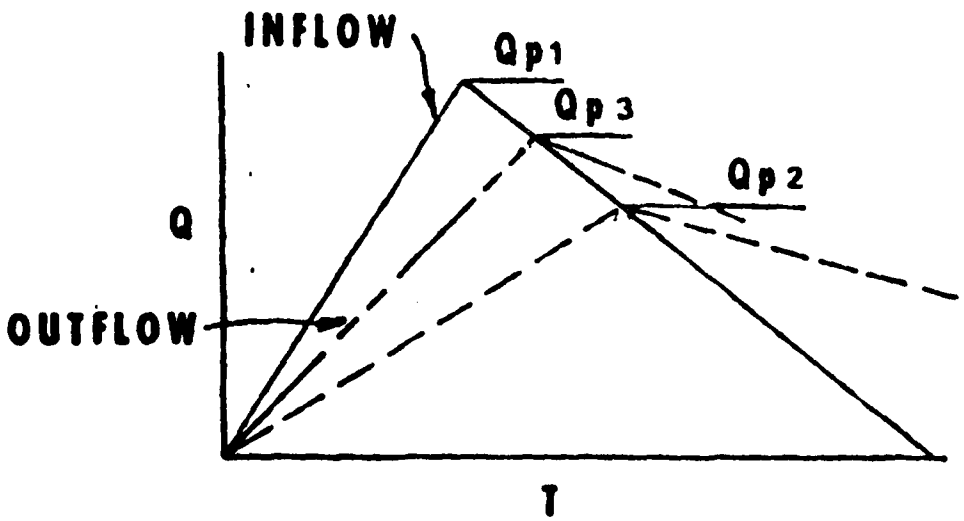
MAXIMUM PROBABLE FLOWS BASED ON TWICE THE STANDARD PROJECT FLOOD (Flat and Coastal Areas)

	River	SPF (cfs)	D.A. (sq. mi.)	MPF (cfs/sq. mi.)
1.	Pawtuxet River	19,000	200	190
2.	Mill River (R.I.)	8,500	34	500
3.	Peters River (R.I.)	3,200	13	490
4.	Kettle Brook	8,000	30	530
5.	Sudbury River.	11,700	86	270
6.	Indian Brook (Hopk.)	1,000	5.9	340
7.	Charles River.	6,000	184	65
8.	Blackstone River.	43,000	416	200
9.	Quinebaug River	55,000	331	330


MAXIMUM PROBABLE FLOOI
PEAK FLOW RATES
x5 - NED DAM IDENTIFICATION
⊗7' - TWICE SPF AT INDICATED SIT
DEC. 1977
M.P.F. IN C.F.S./SQ. MILE
DRAINAGE AREA IN SQ. MILES
3000
2500
2000
1500
1000
500
0
2
5
10
50
100
500
MOUNTAINOUS
ROLLING
FLAT & COASTAL
x15
x4
x10
x2
x6
x14
x1
12x
3x
13x
28x
x25
x27
9x
x24
x26
9x
x17
18x
16x
x29
x17
x20
30x
22x
x8
35x
x21
x32
x23
x33
31x
3'⊗
4'⊗
2'⊗
6'⊗
5'⊗
9'⊗
2'⊗
8'⊗
7'⊗

D-4

ESTIMATING EFFECT OF SURCHARGE STORAGE ON MAXIMUM PROBABLE DISCHARGES



STEP 1: Determine Peak Inflow (Q_{p1}) from Guide Curves.

STEP 2: a. Determine Surcharge Height To Pass "Q_{p1}".

b. Determine Volume of Surcharge ($STOR_1$) In Inches of Runoff.

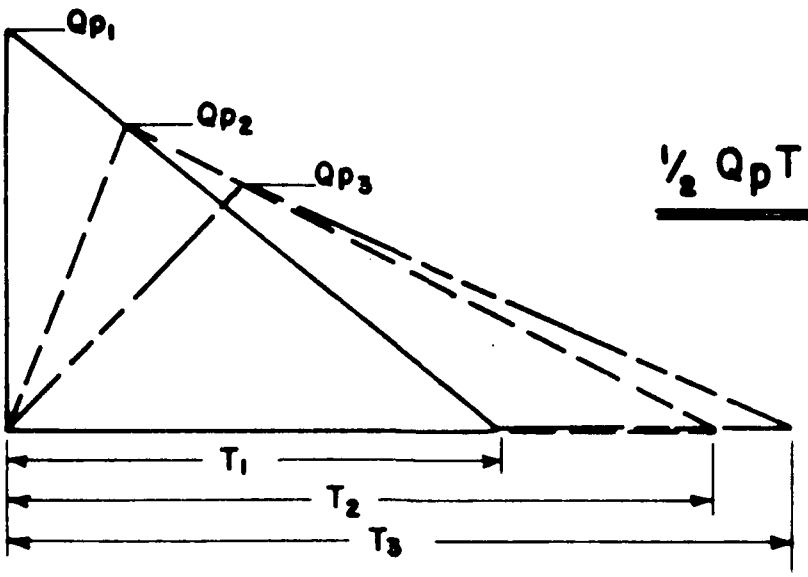
c. Maximum Probable Flood Runoff In New England equals Approx. 19", Therefore

$$Q_{p2} = Q_{p1} \times \left(1 - \frac{STOR_1}{19}\right)$$

STEP 3: a. Determine Surcharge Height and "$STOR_2$" To Pass "Q_{p2}"

b. Average "$STOR_1$" and "$STOR_2$" and Determine Average Surcharge and Resulting Peak Outflow "Q_{p3}".

"RULE OF THUMB" GUIDANCE FOR ESTIMATING DOWNSTREAM DAM FAILURE HYDROGRAPHS



$\frac{1}{2} Q_p T = 12 S$

STEP 1: DETERMINE OR ESTIMATE RESERVOIR STORAGE (S) IN AC-FT AT TIME OF FAILURE.

STEP 2: DETERMINE PEAK FAILURE OUTFLOW (Q_{p1}).

$$Qp_1 = \frac{8}{27} W_b \sqrt{g} Y_o^{\frac{3}{2}}$$

W_b = BREACH WIDTH - SUGGEST VALUE NOT GREATER THAN 40% OF DAM LENGTH ACROSS RIVER AT MID HEIGHT.

Y_o = TOTAL HEIGHT FROM RIVER BED TO POOL LEVEL AT FAILURE.

STEP 3: USING USGS TOPO OR OTHER DATA, DEVELOP REPRESENTATIVE STAGE-DISCHARGE RATING FOR SELECTED DOWNSTREAM RIVER REACH.

STEP 4: ESTIMATE REACH OUTFLOW (Q_{p2}) USING FOLLOWING ITERATION.

A. APPLY Q_{p1} TO STAGE RATING, DETERMINE STAGE AND ACCOPMANYING VOLUME (V_1) IN REACH IN AC-FT. (NOTE: IF V_1 EXCEEDS 1/2 OF S, SELECT SHORTER REACH.)

B. DETERMINE TRIAL Q_{p2}.

$$Qp_2(\text{TRIAL}) = Qp_1 \left(1 - \frac{V_1}{S}\right)$$

C. COMPUTE V_2 USING Q_{p2} (TRIAL).

D. AVERAGE V_1 AND V_2 AND COMPUTE Q_{p2}.

$$Qp_2 = Qp_1 \left(1 - \frac{V_{ave}}{S}\right)$$

STEP 5: FOR SUCCEEDING REACHES REPEAT STEPS 3 AND 4.

APRIL 1978

HYDROLOGIC/HYDRAULIC INSPECTION

GREAT HILL RESERVOIR, SEYMOUR, CONN.

(1) MAXIMUM PROBABLE FLOOD - PEAK FLOOD RATE

(a) WATERSHED CLASSIFIED AS "MOUNTAINOUS" TYPE. USE MPF MOUNTAINOUS TYPE CURVE FURNISHED BY THE ACE NEW ENGLAND DIV OFFICE FOR THE DETERMINATION OF MPF.

(b) WATERSHED AREA D.A. = 2.64 SQ. MI (AS MEASURED BY CE)

(c) FROM GUIDE CURVE:

MPF ≅ 2,500 CFS / SQ. MI

(d) M.P.F = PEAK INFLOW

Q = 2,500 × 2.64 = 6,600 CFS

(2) SPILLWAY DESIGN FLOOD (SDF)

(a) CLASSIFICATION OF DAM ACCORDING TO ACE RECOMMENDED GUIDELINES.

(1) SIZE (IMPOUNDMENT). STORAGE (MAX) = * 378 AC-FT (SMALL)

HEIGHT = 37 FT (SMALL)

FROM BIRMINGHAM WATER CO - "FOUR MILE BROOK DAM" DWG. DATED AUG. 16. 1909 TOP ELEV. OF DAM EL 293
STREAM BED ELEV. ± 256 GIVES HEIGHT OF DAM = 37'

* FROM INVENTORY OF DAMS IN THE UNITED STATES, DATED 3/10/78
DEL. AREA OF POND ± 15 AC. ∴ CAP. ≯ ⅓ (15×3) = 185 AC-FT × USE 378 AC-FT
C.C.E. CHECK MEASURE 13.8 AC)

THE DAM IS CLASSIFIED TO BE "SMALL"

HYDROLOGIC / HYDRAULIC INSPECTION

GREAT HILL RESERVOIR, SEYMOUR, CONN.

(2) (CONT'd) - SPILLWAY DESIGN FLOOD (SDF)

(a) CLASSIFICATION OF DAM

(ii) HAZARD POTENTIAL.

THE DAM IS RATED OF "HIGH" HAZARD POTENTIAL BECAUSE IT IS U/S OF SEVERAL HOUSES AT RELATIVELY LOW ELEV. ALONG FOUR MILE BROOK AND RTE 34, TO THE HOUSTONIC RIVER 1 MILE ± DOWNSTREAM

(iii) SDF

ACCORDING TO ACE RECOMMENDED GUIDE LINES FOR THIS DAM, THE SDF WILL BE FROM $\frac{1}{2}$ MPF TO MPF

ASSUMING SDF = MPF = 6,600 CFS

(3) EFFECT OF SURCHARGE STORAGE ON MAXIMUM PROBABLE DISCHARGES

(a) PEAK INFLOW (SDF = MPF)

Q_{P_1} = 6,600 CFS

(b) SURCHARGE HEIGHT TO PASS Q_{P_1}

(i) ESTIMATE SURCHARGE ABOVE SPILLWAY CREST

LENGTH OF SPILLWAY = 40'

ELEVATION OF FLOWLINE ABOVE STREAM BED, P = ±34'

(SEE BIRMINGHAM WATER Co - FOUR MILE BROOK DAM DWG. OF 8/16/09)

D-8

HYDROLOGIC / HYDRAULIC INSPECTION

GREAT HILL RESERVOIR, SEYMOUR, CONN

(3) (cont'd) EFFECT OF SURCHARGE STORAGE ON MAXIMUM PROBABLE DISCHARGES

(b) SURCHARGE HEIGHT TO PASS Q_{P_1}

(i) ESTIMATE SURCHARGE ABOVE SPILLWAY CREST

SPILLWAY IS OF ROUND-CRESTED OGEE TYPE
VERTICAL U/S FACE AND
D/S SLOPE (V:H) = 2:1

ASSUME $C \cong 3.9$

$$Q \cong (3.9)(40) H^{3/2}$$

$$H \cong \left(\frac{Q}{156}\right)^{2/3}$$

@ $Q_{P_1} = 6,600$ CFS

$H_1 \cong 12.1'$

MAXIMUM FREEBOARD FROM SPILLWAY TO TOP OF DAM IS 3.0' THE DAM IS OVERTOPPED.

SPILLWAY CAPACITY AT $H = 3.0'$ $Q = 810$ CFS

HYDROLOGIC / HYDRAULIC INSPECTION

GREAT HILL RESERVOIR, SEYMOUR, CONN

(3) (cont'd) EFFECT OF SURCHARGE STORAGE ON MAXIMUM PROBABLE DISCHARGES

(b) SURCHARGE HEIGHT TO PASS Q_{p_1}

(ii) COMPUTE TRUE SURCHARGE HEIGHT H_1

DEPTH OF HEAD WATER ABOVE TOP OF THE DAM $= H_1 - 3$

LENGTH OF DAM (EXCLUDING GATE HOUSE) = 150'

TOP WIDTH OF DAM = 6'

VERTICAL U/S FACE AND D/S SLOPE OF (V=H) = 2:1

ASSUME $C \simeq 2.7$

$$Q \simeq (2.7)(150)(H_1 - 3)^{3/2}$$

A BERM AT THE EASTERLY END RISES 7' IN A DISTANCE OF ± 30'

ASSUME EQUIVALENT LENGTH $= \frac{2}{3}\left(\frac{30}{7}\right)(H_1 - 3)$

ASSUME $C \simeq 2.6$

$$Q \simeq (2.6)\frac{2}{3}\left(\frac{30}{7}\right)(H_1 - 3)^{5/2}$$

HYDROLOGIC / HYDRAULIC INSPECTION

GREAT HILL RESERVOIR, SEYMOUR, CONN

(3) (cont'd) EFFECT OF SURCHARGE STORAGE ON MAXIMUM PROBABLE DISCHARGES

(b) SURCHARGE HEIGHT TO PASS Q_{p_1}

(ii) COMPUTE TRUE SURCHARGE HEIGHT H_1

A BERM AT THE WESTERLY END RISES 2' IN A DISTANCE OF ±35'

ASSUME EQUIVALENT LENGTH $= \frac{2}{3}\left(\frac{35}{2}\right)(H_1 - 3)$

ASSUME $C \approx 2.6$

$$Q \approx (2.6)\left(\frac{2}{3}\right)\left(\frac{35}{2}\right)(H_1 - 3)^{5/2}$$

THEREFORE, DISCHARGE AT SURCHARGE HEIGHT H_1 IS

$$* Q \approx (3.9)(40) H_1^{3/2} + (2.7)(150)(H_1 - 3)^{3/2} + (2.6)\left(\frac{2}{3}\right)\left(\frac{30}{7}\right)(H_1 - 3)^{5/2} + (2.6)\left(\frac{2}{3}\right)\left(\frac{35}{2}\right)(H_1 - 3)^{5/2}$$

FOR $Q_{p_1} = 6,600$ CFS

$H_1 \approx 6.7'$

HENCE, THE DAM IS OVERTOPPED WITH A HEAD OF ± 3.7'

$$* Q \approx 156 H^{3/2} + 405 (H - 3)^{3/2} + 37.8 (H - 3)^{5/2}$$

HYDROLOGIC/HYDRAULIC INSPECTION

GREAT HILL RESERVOIR, SEYMOUR, CONN

(3) (CONT'D) EFFECT OF SURCHARGE STORAGE ON MAXIMUM PROBABLE DISCHARGES.

(c) VOLUME OF SURCHARGE.

ASSUME NORMAL POOL LEVEL 0.25' ABOVE THE FLOWLINE (MAX. IN RECORD 4")

AREA OF POOL AT FLOWLINE 15 Ac (See p.1)

VOLUME OF SURCHARGE WITH

$Q_{P1} = 6,600$ CFS

$H_1 \approx 6.7'$

$15(6.7 - 0.25) = 97$ Ac-ft

D.A. = 2.64 SQ. MI (See p.1)

$$S_1 = \frac{86}{2.64 \times 533} \approx 0.69"$$

(d) PEAK OUTFLOW FOR SURCHARGE S_1 (See GUIDELINES BY ACE NEW ENGLAND DIV)

$$Q_{P2} = Q_{P1}\left(1 - \frac{S_1}{19}\right)$$

$$Q_{P2} = 6,600\left(1 - \frac{0.69}{19}\right)$$

$$Q_{P2} \approx 6,400 \text{ CFS}$$

HYDROLOGIC/HYDRAULIC INSPECTION

GREAT HILL RESERVOIR, SEYMOUR, CONN

(3) (cont'd) EFFECT OF SURCHARGE STORAGE ON MAXIMUM PROBABLE DISCHARGES.

(d) PEAK OUTFLOW FOR SURCHARGE S_1

For $Q_{p_2} \doteq 6,400$ CFS

$H_2 \doteq 6.6'$

AND $S_2 \doteq 0.68''$ $S_{AVE} = 0.685''$

(e) RESULTING PEAK OUTFLOW

$$Q_{p_3} = 6,600\left(1 - \frac{0.685}{19}\right)$$

$\doteq 6,400$ CFS

$H_3 \doteq 6.62'$ SAY, $6.6'$

(f) SUMMARY:

PEAK INFLOW $Q_{p_1} = MPF = 6,600$ CFS

PEAK OUTFLOW $Q_{p_3} = 6,400$ CFS

SURCHARGE ABOVE THE SPILLWAY CREST IS $\pm 6.6'$. IT IS $\pm 3.6'$ ABOVE THE TOP OF THE DAM.

HYDROLOGIC / HYDRAULIC INSPECTION

GREAT HILL, SEYMOUR CT DOWNSTREAM FLOOD HAZARD

(1) ESTIMATE OF DOWNSTREAM DAM FAILURE HYDROGRAPH
(SEE ACE "RULE OF THUMB" GUIDANCE FOR ESTIMATING THE HYDROGRAPHS)

(a) ESTIMATE OF RESERVOIR STORAGE(S) AT TIME OF FAILURE
(SEE D. SHEN Comps. 5/25/1978)

(i) MAX STORAGE CAPACITY = 378 Ac-ft

(ii) MAX POOL DEPTH ABOVE D/S STREAM BED ELEV ±256
Y ≈ 293 - 256 = 37'

(iii) ESTIMATED VOLUME OF STORAGE AT TIME OF FAILURE.
(TO A SURCHARGE OF ±6.6 ft ABOVE THE SPILLWAY CREST, OR ±3.6 ft ABOVE THE TOP OF THE DAM)

HYDROLOGIC / HYDRAULIC INSPECTION

GREAT HILL, SEYMOUR, CONN DOWNSTREAM FLOOD HAZARD

(i) (cont'd) ESTIMATE OF D/S DAM FAILURE HYDROGRAPH

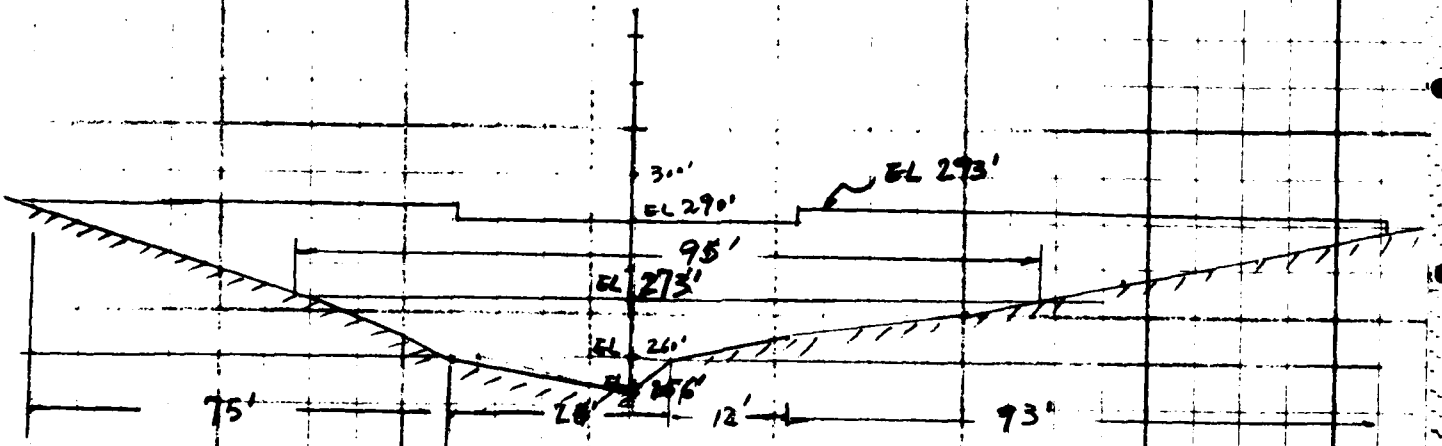
(a) ESTIMATE OF RESERVOIR STORAGE AT TIME OF FAILURE

(vi) ESTIMATED RES. STORAGE(S) AT TIME OF FAILURE

$S \approx 378 \pm 15 \times 3.6 \approx 430$ AC-FT $\therefore \frac{S}{2} \approx 215$ AC-FT

(b) PEAK FAILURE OUTFLOW (Q_{pi})

(i) BREACH WIDTH.



APPROX. CROSS SECTION OF DAM (NOT TO SCALE)

ESTIMATION OF BREACH WIDTH MADE ON PLANN FURNISHED BY BIRMINGHAM WATER CO. AUG 16, 1909. APPROX AT EL 273'

40% OF DAM LENGTH ACROSS RIVER AT MID HEIGHT

$W = 95 \times 0.4 = 38'$ TAKE $W = 38'$

HYDROLOGIC / HYDRAULIC INSPECTION

GREAT HILL SEYMOUR, CONN. DOWNSTREAM FLOOD HAZARD

(1) (CONT'd) ESTIMATE OF D/S DAM FAILURE HYDROGRAPH

(b) PEAK FAILURE OUTFLOW (Q_{p_1})

(i) TOTAL HEIGHT AT TIME OF FAILURE

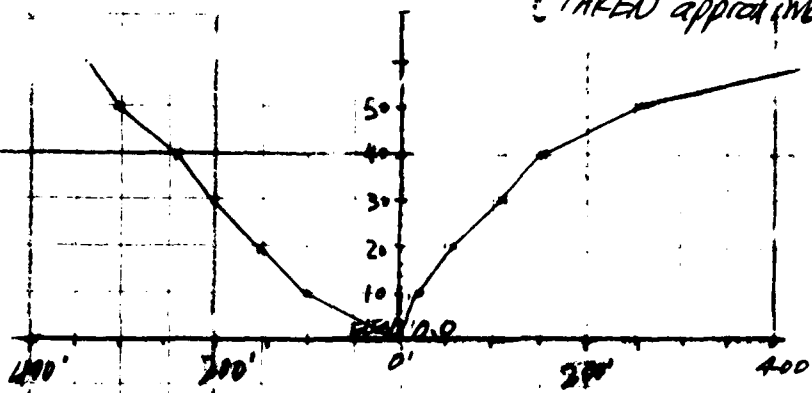
HEIGHT OF DAM = 37'
SURCHARGE = 3.6'

$Y_o = 40.6'$

(iii) PEAK FAILURE OUTFLOW:

$$Q_{p_1} = \frac{8}{27} W_b \sqrt{g} y_o^{3/2} = 16{,}500 \text{ CFS}$$ (See note A Sheet 5)

(c) REPRESENTATIVE D/S CROSS-SECTION RATING CURVE
(FROM U.S.G.S, LONG HILL QUADRANGLE SHEET)
(TAKEN approximately ½ mile downstream



Assume 1) $n \approx 0.050$
2) $S \approx 0.046$ (VERTICAL DROP 230' IN 5000' DISTANCE)

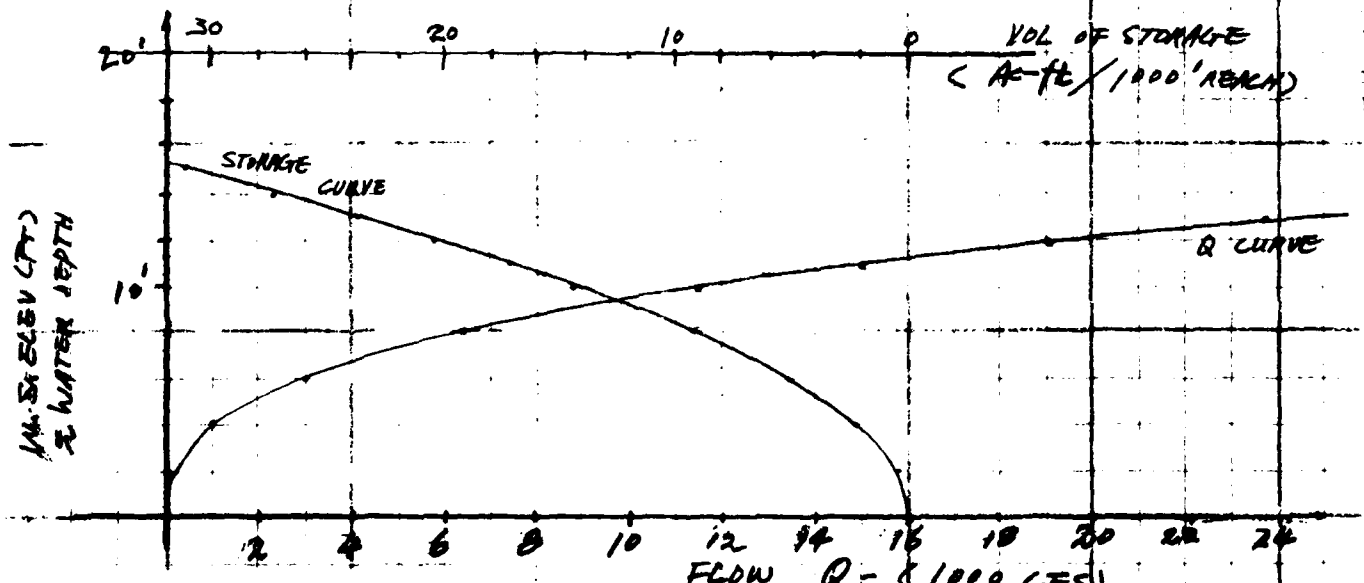
D-16

HYDROLOGIC / HYDRAULIC INSPECTION

GREAT HILL SEYMOUR, CONN. DOWNSTREAM FLOOD HAZARD

(1) (CONT'D) ESTIMATE OF D/S DAM FAILURE HYDROGRAPH

(c) REPRESENTATIVE D/S CROSS-SECTION RATING CURVE



(d) REACH OUTFLOW (Q_{p2}) - (TRY 5000' LONG REACH)

(i) @ Q_{p_1} = 16,500 CFS, FROM RATING CURVE
STAGE ≈ 11.4'

∴ VOLUME IN REACH $V_1 \equiv 18 \times 5 = 90$ AC-FT $< \frac{1}{2} S$ O.K
$\frac{1}{2} S \equiv 215$ AC-FT

(ii) Q_{p_2}

Q_{p_2} (TRIAL) $= Q_{p_1}\left(1 - \frac{V_1}{S}\right) = 16{,}500\left(1 - \frac{90}{430}\right)$

$= 13{,}000$ CFS

HYDROLOGIC / HYDRAULIC INSPECTION

GREAT HILL SEYMOUR. CONN DOWNSTREAM FLOOD HAZARD

(1) (CONT'd) ESTIMATE OF D/S DAM FAILURE HYDROGRAPH

(d) REACH OUTFLOW (Q_{p_2})

(iii) @ Q_{p_2} = 13,000 CFS STAGE = 10.5'

$V_2 \simeq 15.6 \times 5 = 78$ AC-FT

(iv) AVERAGE VOLUME IN REACH

$V_{Av2} = 84$ AC-FT

$Q_{p_2} = 16,500 \left(1 - \frac{84}{430}\right)$

$= \underline{13,300 \text{ CFS}}$ (See note A Below)

STAGE = $\underline{10.7' \approx 10'}$

SUMMARY: PEAK FAILURE OUTFLOW Q_{p_1} = 16,500 CFS

PEAK REACH OUTFLOW Q_{p_2} = 13,300 CFS

~~AVG. DOWNSTREAM FLOOD STAGE 10.7 FT~~

APPROX. DEPTH IMMEDIATE D/S OF DAMSITE

$Y \simeq 0.44 \times 40.6 \simeq 18'$

Note A

Depending on the breach location this flow could be a few thousand cfs larger for a very brief period when combined with surcharge / spillway flow from the unbreached portion of the dam

Cahn Engineers Inc. Consulting Engineers

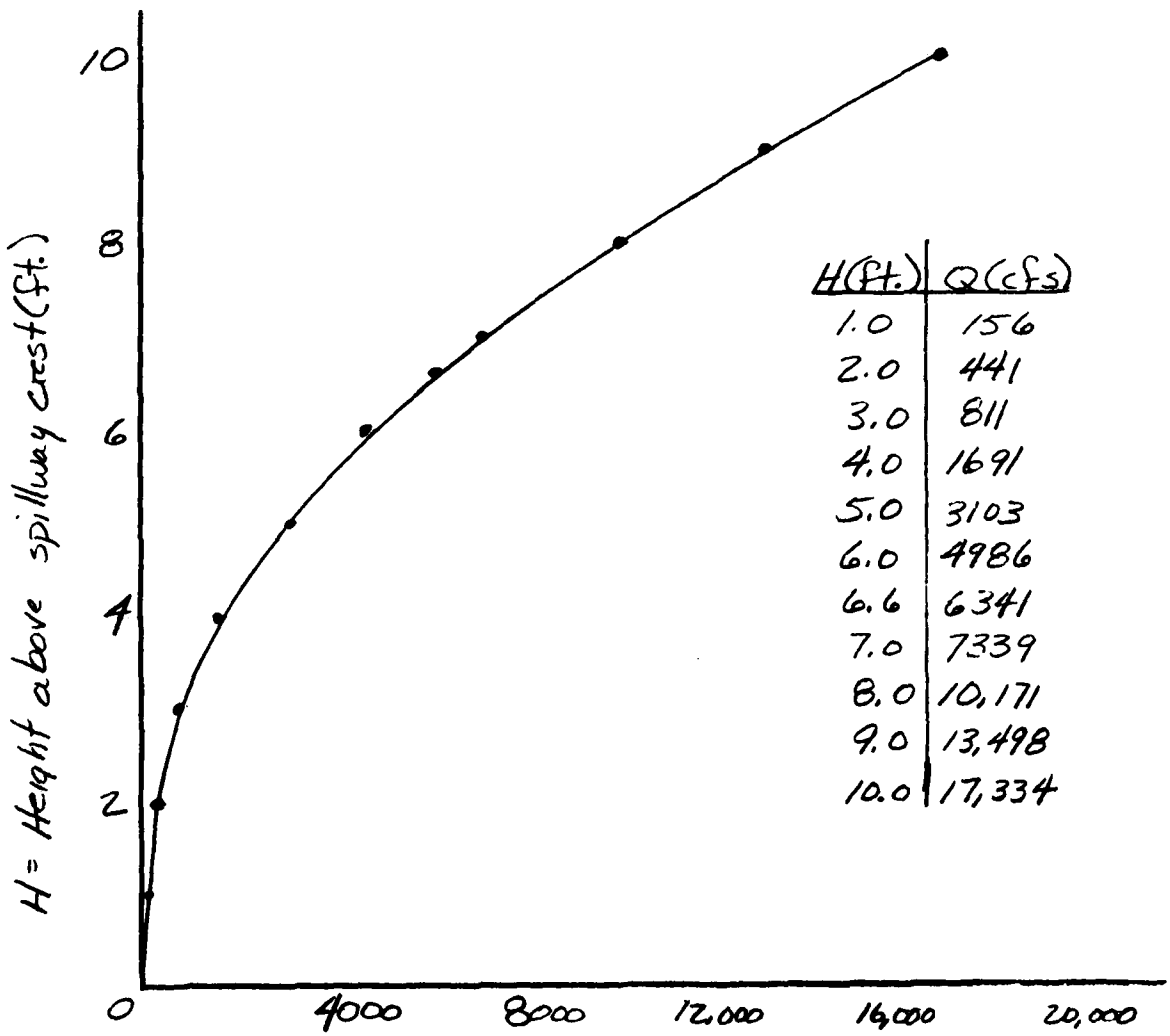
Project GREAT HILL DAM Sheet 1 of 1

Computed By HM/CRG Checked By _____ Date 9/8/78

Field Book Ref. _____ Other Refs. _____ Revisions _____

SPILLWAY RATING CURVE

$$Q = 156\,H^{3/2} + 405(H-3)^{3/2} + 37.8(H-3)^{5/2}$$



H(ft.)	Q(cfs)
1.0	156
2.0	441
3.0	811
4.0	1691
5.0	3103
6.0	4986
6.6	6341
7.0	7339
8.0	10,171
9.0	13,498
10.0	17,334

D-18A

NOTE:

THESE COMPUTATIONS HAVE BEEN PERFORMED BASED UPON A DAM BREACH WITH A SURCHARGED WATER SURFACE ELEVATION. IN ACCORDANCE WITH NORMAL CORPS PROCEDURES, COMPUTATIONS ARE PERFORMED BASED UPON A WATER SURFACE ELEVATION AT THE TOP OF THE DAM. A DAM BREACH WITH THE WATER SURFACE AT THE TOP OF THE DAM AND WITHOUT HEAVY DOWN-STREAM CHANNEL FLOW COULD BE MORE CRITICAL THAN A DAM BREACH WITH A SURCHARGE. THE DIFFERENCE, IN THIS CASE, IS NOT SUBSTANTIAL.

APPENDIX E

INFORMATION AS CONTAINED IN

THE NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS IN THE UNITED STATES

STATE	IDENTITY NUMBER	DIVISION	STATE	COUNTY	CONGR DIST.	STATE	COUNTY	CONGR DIST.	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY | MO | YR
CT	87	NED	CT	009	05				GREAT HILL RESERVOIR DAM	4122.6	7307.9	15AUG78

POPULAR NAME	NAME OF IMPOUNDMENT
	GREAT HILL RESERVOIR

REGION	BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY-TOWN-VILLAGE	DIST FROM DAM (MI.)	POPULATION
01	01	FOUR MILE BROOK	SHELTON	4	30000

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (FT.)	HYDRAULIC HEIGHT (FT.)	IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT.)	IMPOUNDING CAPACITIES NORMAL (ACRE-FT.)	DIST	OWN	FED R	PRV/FED	SCS A	VER/DATE
CTPG	1909	S	41	37	378	360	NED	N	N	N	N	09AUG78

REMARKS

D/S HAS	SPILLWAY CREST LENGTH	SPILLWAY TYPE	SPILLWAY WIDTH (FT.)	MAXIMUM DISCHARGE (FT.)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PROPOSED (MW)	NAVIGATION LOCKS NO	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)
1	210	U	40	810	3300											

OWNER	ENGINEERING BY	CONSTRUCTION BY
ANSONIA-DERBY WATER CO		

REGULATORY AGENCY			
DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
NONE	NONE	NONE	NONE

INSPECTION BY	INSPECTION DATE DAY | MO | YR	AUTHORITY FOR INSPECTION
CAHN ENGINEERS, INC	25MAY78	PL 92-367

REMARKS

END

FILMED

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DTIC